



Modelling the initial 3D sediment structure of an artificially constructed hydrological catchment

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The initial development stages of an artificially-constructed catchment area using quaternary non-weathered sediments are characterized by the absence of soil organic matter, vegetation or soil horizons (i.e., a soil-geosystem). Bare soil surfaces favour particularly the surface runoff and erosion processes that initially dominate the structural dynamics. The mass balance of sediment transport and deposition at the soil surface have hardly been visualized and quantified in 3D structure models. The objective of this study was the digital visualization and quantification of sediment mass balances based on the initial 3D structure and exemplified for a small artificial catchment area completed in November 2005. Photogram metric surveys of surface and internal structural units (clay basis liner) during the construction phase provided data for the digital elevation model (DEM). Interpolated physical and chemical soil properties obtained at a borehole grid (e.g., texture) are used for the visualization of spatial distribution of parameters. The data are merged in a database and visualized in a 3D-GIS application (GoCAD). The visualization will be used to identify more or less homogeneous morphologically units of different structures and to quantify sediment relocation. The 3D structure model serves as the base for deriving the 3D-distributions of hydraulic properties for the modelling of surface runoff, erosion and soil water and solute move-

ment. The 3D structure model allows quantification of volumetric mass changes in time and a first approximation of the erosion-affected surface structural dynamic of the developing soil-geosystem.